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Research, part of a Special Feature on Private Land Conservation – Landowner Motives, Policies, and Outcomes of Conservation Measures in Unprotected Landscapes

Opportunities and obstacles for rangeland conservation in San Diego County, California, USA

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ABSTRACT. Working landscapes such as rangelands are increasingly recognized as having high conservation value, providing a variety of ecosystem services, including food, fiber, habitat, recreation, open space, carbon storage, and water, in addition to a broad range of social benefits. However, conversion of rangelands to other land uses has been prevalent throughout the western United States, leading to greater attention in the conservation community to the importance of collaborating with private landowners. The level of interest in collaborative conservation among private landowners and the types of conservation programs they choose to participate in depend on the social, economic, and environmental context. We used GIS analysis and interviews with ranchers to evaluate rangeland conversion and participation in conservation programs among ranchers in San Diego County, California, USA, which is part of a biodiversity hotspot with high plant species richness and a large number of endemic and rare species. We found that 21,210 ha (3.1%) of rangelands were converted to other uses over the past 25 years, primarily for urbanization, while the area of public rangeland increased by 9%. Interviews revealed that ranchers in San Diego County have had limited involvement with most conservation programs, and a critical factor for nonparticipation was providing programs access to private land, along with other issues related to trust and social values. Among ranchers who had participated in conservation programs, the payment level and the agency or organization administering the program were key factors. Our results provide insight into factors influencing whether and when ranchers are likely to participate in conservation initiatives and illustrate that private and public land conservation are strongly linked and would be more effective if the two strategies were better integrated.

Key Words: *conservation; ecosystem services; private land conservation; rangeland; working landscapes*

INTRODUCTION

Working landscapes such as rangelands are increasingly recognized as having high conservation value and a broad range of social benefits (Sulak and Huntsinger 2007, Wetzel et al. 2012). Globally, rangelands are the most extensive land cover, they provide 91% of grazing lands, and 1–2 billion people rely on them for part of their livelihoods (Sayre et al. 2013, Reid et al. 2014). Rangelands provide a wide range of ecosystem services such as food and fiber, carbon storage (including ~30% of the world's soil carbon), recreation, open space, and water supply (Booker et al. 2013, Sayre et al. 2013, Yahdjian et al. 2015). They also provide habitat for numerous species, including many endangered and endemic species, as well as habitat connectivity between protected areas (Brunson and Huntsinger 2008, Cameron et al. 2014). However, globally, 20% of rangelands have been degraded, with an additional 12 million ha being degraded worldwide each year (Brunson 2014). From North America to Australia, rangelands have been converted to other uses because of factors such as suburban and exurban development, population growth, and agricultural expansion (Cross et al. 2011, Cameron et al. 2014, Henderson et al. 2014, Reid et al. 2014).

In the western United States, rangelands cover more than 163 million ha, with land use dominated by cattle and sheep ranching; however, 45% of U.S. ranches are sold each year (Gosnell and Travis 2005, Brunson and Huntsinger 2008, Cameron et al. 2014). Ranching operations in the western United States typically suffer from low profitability, high management and opportunity costs associated with competing uses, and other factors that contribute to conversion of these lands to other uses (Sulak and Huntsinger 2007, Cheatum et al. 2011). The widespread conversion of rangelands for development and more intensive forms of agriculture has led to concerns about loss of habitat and open space and diminished provision of ecosystem services (Cameron et al. 2014). Brunson (2014:6) notes that, globally, conversion of rangelands often diminishes their benefits to society, leaving range managers and policy makers seeking to answer the question, "How can we slow the trend of degradation and conversion so that their [rangelands'] benefits to society and to ecosystems are not lost?"

In response to this question, the conservation community has recognized the important role played by private landowners in protecting biodiversity and ecosystem services. In the United States, approximately 50% of rangelands are private lands (Sayre et al. 2013). Among the species listed as threatened or endangered in the United States, 95% have at least some of their habitat on private lands, and 19% require habitat that exists exclusively on private land (Knight 1999, Hilty and Merenlender 2003, Merenlender et al. 2004). This situation has led to a greater focus on maintaining ranches intact. As noted by Brunson and Huntsinger (2008:137), many conservationists "prefer ranching as a land use over exurban subdivisions, and… see private land conservation as a needed alternative to underfunded and controversial public acquisition."

A variety of mechanisms have been used to promote conservation on private lands, including traditional forms of regulation; however, questions about the effectiveness of these approaches and landowner resistance to regulation led to growing support for alternative approaches (Bonnie 1999, Knight 1999, Cocklin et al. 2007). Efforts to work with private landowners as partners

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Erratum: Due to erroneous values the original Table 1 and text referring to the table, including text in the abstract, was changed on 15 May 2017. On 30 May 2017 errors in the paragraph preceding Table 1 were corrected. . The value "12,926" was changed to "13,926", and the value "7,285" was changed to "7,284".

in conservation have resulted in a variety of incentive-based mechanisms to promote land use and management that will help meet conservation goals (Brunson and Huntsinger 2008, Reid et al. 2014). Globally, incentives for rangeland conservation are being implemented in a wide variety of contexts (Reid et al. 2014). In Australia, research has indicated support among landowners for initiatives that provide financial assistance to landowners providing ecosystem services (Cocklin et al. 2007). Gosnell et al. (2011:24) also found "cautious optimism" among ranchers in Montana, Wyoming, New Mexico, and Colorado, USA regarding compensation for carbon sequestration. In California, USA, the potential role of incentive-based conservation programs has grown as state funding for the *Williamson Act* (*California Land Conservation Act* of 1965) has shrunk. Without the *Williamson Act,* which reduces property taxes when landowners agree to keep land out of development on 10-yr contracts, many ranchers expect to sell portions of their land for development (Wetzel et al. 2012).

However, as noted by Brunson and Huntsinger (2008:138), "conservation through private ownership is a complex process." Whether private landowners choose to participate in conservation programs, and what types of programs they choose to participate in, depend on the social-economic-environmental context (Rissman and Sayre 2012). Landowners base decisions not only on the individual costs and benefits, but also on program rules and the effectiveness of communication with government representatives and nongovernmental organizations (Kosoy et al. 2008). Multiple factors may influence decision making, including ranch size, income sources, social networks, social values, views regarding property rights, trust in agencies and organizations involved, and attitudes about the conservation value of the land and potential conservation outcomes (Lubell et al. 2013, Brain et al. 2014). For example, Cheatum et al. (2011) found that ranchers' levels of participation in conservation programs were influenced by both ranchers' own characteristics and attitudes, as well as characteristics of the conservation programs and associated land-management practices. Henderson et al. (2014) found five key themes related to ranchers' attitudes toward conservation of species at risk, including the existing role of ranchers as stewards, rewards for that stewardship, financial factors, trust and communication, and a desire not to be disturbed.

These studies provide a basis for research in San Diego County, California, where there has been little analysis of rangeland conservation. The county is the third largest in California, with > 3 million inhabitants. It spans from the coast to mountains > 1200 m in elevation and encompasses a range of ecosystem types, including coastal sage scrub, chaparral, grasslands, and oak woodlands. It is part of a biodiversity hotspot, with high plant species richness and many endemic and rare species (Hierl et al. 2008). Habitat loss and fragmentation are concerns for biodiversity conservation given the region's high levels of population growth, increasing urbanization, and pressure to develop land (Hierl et al. 2008, Syphard et al. 2011). Although most urban development has occurred along the coast, development is increasingly moving eastward (Syphard et al. 2011) into areas where rangelands are the dominant land cover. As noted by Underwood (2011:123), the "combination of high biodiversity, large numbers of rare and unique species, and rapid urbanization has led to conflicts between growth and biological conservation." One response to this conflict is the Multiple Species Conservation Program (MSCP), implemented in 1997 in an effort to balance biological and social needs in protecting San Diego County's biodiversity (Greer 2004, Franklin et al. 2011).

In spite of the high conservation value of rangelands and the trend toward rangeland loss, limited research has been conducted on rangelands in San Diego County. In particular, little is known about the rate or type of rangeland conversion or the degree to which landowners are participating or are willing to participate in conservation programs. To address this gap, we evaluated the following research questions: (1) What is the extent and type of rangeland conversion in San Diego County over the past 25 years? (2) What is the level of participation in conservation programs among ranchers? (3) What factors influence decisions about participation in conservation programs? (4) To what degree has private rangeland been converted to public land? (5) What are ranchers' perceptions of the conversion of private rangeland to public land? Given that grazing is the dominant land use globally, conservation insights from this region can be useful for other regions of the world where there is a need to balance livelihoods and conservation in rangelands.

METHODS

We used a mixed methods approach to address these questions, including GIS analysis of rangeland land use and ownership, and structured interviews with ranchers. We conducted a rangeland land-cover change analysis for San Diego County for the period from 1992 to 2011 using the National Land Cover Database (NLCD), which provides data for 1992, 2001, 2006, and 2011. The data for 1992 are not directly comparable with other years; however, a land-cover change product for 1992 to 2001 was released by the NLCD to address this issue. We used land-cover change produced by NLCD for 1992–2001, and we calculated land-cover change for 2001–2011 using ESRI ArcGIS 10.2 (Homer et al. 2004, Fry et al. 2009, Jin et al. 2013). Data for the extent of public land holdings and MSCP regions were derived from the San Diego Association of Governments (SANDAG) Regional GIS Data Warehouse. Public land was aggregated into three categories for mapping: federal, state, and county/city. Livestock grazing allotment data for the Cleveland National Forest were provided by the U.S. Forest Service.

We conducted in-depth structured interviews with ranchers in San Diego County, focusing on participation and interest in conservation programs and use of conservation practices. Interviews were based on Cheatum et al. (2011)'s mail survey to obtain data that could be compared with other parts of the United States. We modified their survey to address our research questions, to be more specific to the San Diego context, and to include open-ended questions appropriate to in-person interviews. The questions focused on themes of: land use, ownership, and leases; the future of ranching in the region; conservation practices; conservation program participation; and perspectives on conservation benefits associated with conservation programs. We asked about participation and, where relevant, acreage enrolled and level of satisfaction with a range of conservation programs, including: conservation easements, Environmental Quality Incentives Program, Wildlife Habitat Incentives Program, Cooperative Conservation Partners Initiative, Grassland Reserve Program, Wetlands Reserve Program, Emergency Watershed Protection Program, U.S. Fish and Wildlife Partners for Fish and Wildlife, and the *Williamson Act;* we also asked interviewees for input on any additional programs with which they had experience.

Interviewees included owners of private rangeland, some of whom had grazing leases on public or private land, as well as those who only leased land. We recruited interviewees by sending requests for participation through the California Cattlemen's Association to their San Diego members, as well as by sending letters of introduction to individual ranchers through contacts involved in rangeland management with governmental and nongovernmental organizations. Additional ranchers in San Diego County were then identified through snowball sampling, asking interviewees to refer us to other ranchers. We conducted 13 interviews with ranchers; interviews lasted 1–3 h and were primarily in person, with two by phone and one by email with a follow-up in-person interview, based on preference of interviewees. We transcribed the interviews and used NVivo 11.0 to identify key themes.

Given the small population of ranchers in San Diego County (estimated at < 25 full-time ranchers, some of whom were not willing to be interviewed), our interview sample was too small for statistical analysis. However, like Sayre (2004), we emphasize the importance of in-depth qualitative research to provide a richer understanding of not only who participates in conservation programs, but also why ranchers choose to participate or not to participate. The open-ended interview questions allowed for a more nuanced understanding of ranchers' views and the reasons underlying them than is elicited by most quantitative surveys. This type of information can help inform future conservation policies by enabling more meaningful stakeholder engagement and providing an appreciation for the perspectives and motivations of potential supporters and opponents of conservation strategies (Cocklin et al. 2007, Morrison 2015).

RESULTS

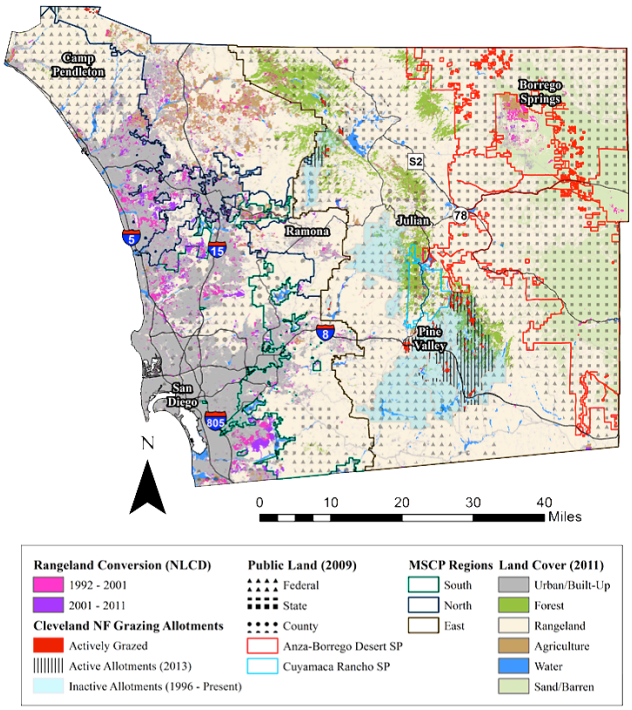
Conversion of rangelands to other uses

In San Diego County, 21,210 ha (3.1%) of rangelands were converted to other uses during the study period (Table 1, Fig. 1). The majority (66%) of the area converted was urbanized, with 13,926 ha of rangelands becoming urban between 1992 and 2011, but the trend slowed from 2001 to 2011. Another 7,284 ha of rangeland was converted to other land uses during that time period, including shifts to crop agriculture, forest cover, and barren land. Almost all of this conversion occurred during the period from 1992 to 2001, with little additional conversion between 2001 and 2011 (Table 1, Fig. 1).

Table 1. Area (ha) and proportion (%) of rangelands converted to other land uses in San Diego County, California, USA, 1992-2011.

Land use to which rangeland was converted:	1992 - 2001	2001 - 2011	Total conversion
Urban	8980 ha (1.3%)	4945 ha (0.7%)	13926 ha (2.0%)
Forest	1916 ha (0.3%)	11 ha (0%)	1927 ha (0.3%)
Agriculture	2088 ha (0.3%)	81 ha (0%)	2169 ha (0.3%)
Barren/Rock	1660 ha (0.2%)	572 ha (0.1%)	2232 ha (0.3%)
Wetland	720 ha (0.1%)	51 ha (0%)	771 ha (0.1%)
Water	110 ha (0%)	76 ha (0%)	186 ha 0%
All land uses	15474 ha (2.26%)	5737 ha (0.85%)	21210 (3.11%)

Fig. 1. Rangeland conversion and public rangelands in San Diego County, California, USA, 1992–2011. Land-cover data were obtained from the National Land Cover Database (NLCD). Data for the extent of public land holdings and Multiple Species Conservation Program regions were derived from the San Diego Association of Governments. Public land was aggregated into three categories for mapping: federal, state, and county/city. Livestock grazing allotment data for the Cleveland National Forest was provided by the U.S. Forest Service. Inactive allotments represent the extent of grazing leases in 1996. Active allotments are currently leased but are not necessarily being actively used for grazing. The actively grazed category defines areas that are designated as appropriate for livestock and are currently grazed under active allotments.



Participation in conservation programs

Ranchers in San Diego County have had limited involvement with most conservation programs with one exception: the majority of interviewees participated in the *Williamson Act.* The Act was widely cited as being highly influential in maintaining land in ranching, with the amount of tax benefit and length of the contract both noted as key factors. Several interviewees mentioned the challenge of paying taxes on their land and noted that prior to the *Williamson Act,* many ranchers were considering selling land to pay their taxes. In interviews, several ranchers focused on the importance of the tax benefit provided to land owners while others mentioned that the cost of leasing land can be lower because of it. Others referred to the length of contracts, noting that because it takes 10 yr to get out of the program, "It makes you stop and think." The effect of the program was seen by many as "enormous." One rancher noted, "If they change the *Williamson Act,* there'd be a lot of land that got sold and taken

out of production. It's the single biggest thing that's kept the backcountry land from being sold off." Another rancher noted, "There wouldn't be any agriculture left up here without the *Williamson Act*. It is extremely important; probably the most important thing," and, in reference to urbanization of rangelands, stated that it had "clearly delayed surplus development in the area."

Few ranchers had experience with other conservation programs, but those who participated did so through conservation easements or the U.S. Department of Agriculture's Natural Resources Conservation Service (NRCS) programs, including the Environmental Quality Incentives Program, which provides incentives to implement conservation practices, and the Wildlife Habitat Incentives Program, designed to enhance habitat for species of concern. One rancher also had experience with NRCS's New and Beginning Farmer and Rancher Program. Among the reasons cited for participation were that the Environmental Quality Incentives Program focused on grazing for wildlife habitat as well as forage efficiency, and it helped provide entry into ranching in a county where high land costs create high barriers to entry. For ranchers participating in conservation easements, the fact that the ranchers' existing practices were allowed was cited as a key reason for participation.

Overall, the factors that most influenced ranchers who did participate in conservation programs were the payment level or tax benefit and the agency or organization administering the program. In terms of the payment, one rancher noted, "I'm open to any program that will give some sort of revenue," and responded very positively to the income received for participating in programs focused on wildlife habitat. One rancher noted the importance of the timing of the payment, stating that the "additional source of income is initially very important," even if it is not what ultimately motivates long-term participation. Financial concerns were also a factor in ranchers' decisions not to participate, with some stating that payments were not high enough or citing concern about lowering their land value. One rancher stated that the economic value of the programs was not enough to justify the time to enroll or to "give up my choice to a government agency." However, others suggested that higher payments would not make a difference; one rancher noted that a lot of people "would rather not be paid and not have someone on their property." Another version of this sentiment was expressed by a rancher who had participated and stated that the payment level was ultimately "less important than belief in the cause."

The agency or organization managing the conservation program also was cited as being important, but ranchers were not unified in their preferences. Most expressed skepticism of government agencies, but not all agencies were viewed equally. One rancher stated that NRCS tended to be seen as "benevolent," whereas the California Department of Fish and Wildlife, the California Coastal Commission, and any agency related to water quality were less trusted, and the U.S. Fish and Wildlife Service and the Army Corps of Engineers were often seen as problematic. However, one rancher preferred working with government agencies, stating, "I like dealing with government agencies, not private ones. They [private agencies] don't really have the money and have to go look for it. Even though personnel change sometimes, I do like the agencies I work with." However, this interviewee also stated that few other ranchers were willing to work with some of these agencies.

The interviewees who did not participate or who were still weighing participation in conservation programs noted a number of relevant factors. The most frequently cited included not wanting outside interference, concern about government restriction and access to property, and other trust issues. One rancher stated, "You never get something for nothing," and another mentioned that there are likely "strings attached." Both of these ranchers referred to potential future problems where the agencies "can come back and bother you years later," and referred to farmers becoming dependent on subsidies after receiving them for a long time, so that they "are at the mercy of the agency that gives it to them."

One of the key trust-related factors influencing participation was providing access to land, which was cited as a critical factor for nonparticipation. For some, granting access could mean opening themselves up to conservation issues beyond those for which they had signed up. For example, one rancher stated, "Someone may present a program with a focus on water or other things, but then they get on the land and an endangered species shows up." Partly for this reason, some ranchers were potentially interested in participating as long as the program was private, not public. Only one rancher conveyed a belief that it would be possible to participate in conservation programs while putting limits on access, citing the possibility of including a "no access without prior notification" clause. The minimal access required also was cited as a key factor for participation in a conservation easement. Another rancher cited trust and access issues even earlier in the process, noting that the enrollment process involved too many questions about sensitive information, which caused that person to opt against participation at the final stages of enrollment.

Skepticism about whether the agencies involved in conservation programs knew what was best for the land also influenced ranchers' decisions not to participate in conservation programs. Many called the agencies' approaches into question, even where there was some support for their conservation goals, as reflected in one rancher's experience with habitat management when a population of endangered butterflies was found on land the family leased. The family lost access to grazing land to protect the butterfly population; however, after cattle were removed, it became clear that the grazing management employed by the family over the previous century was effective at maintaining the habitat, whereas removing grazing was not. This scenario is similar to an incident documented by Weiss (1999) near San Francisco, California, where grazing maintained more suitable butterfly habitat than no grazing. As a result, this rancher expressed an unwillingness to participate in conservation programs, not because of opposition to the goal, but because of the belief that the agencies did not know how best to reach the goal, stating, "They damaged the endangered species and the opportunity to make a living for people who depend on the income."

The remaining reasons cited for nonparticipation included the burden of enrollment and paperwork, a lack of information on existing programs, not being eligible for programs of interest, and a lack of programs that address the most pressing needs. In

particular, ranchers who lease land are not eligible to participate in many programs. One rancher also cited the need for more support for beginning rancher programs, beyond their current 10-yr limit. Another rancher noted, "The process of getting into these things isn't easy. There ought to be some specialists who tell people what they're eligible for, how to do it. If the county wanted to be supportive, they should have some sort of a liaison who walks ranchers through the process."

Changes in rangeland ownership

Engaging private landowners in conservation programs is one response to prevent conversion of rangeland to other land uses. Another response is to purchase rangelands from private landowners by or for public agencies. Our interviews with ranchers revealed that understanding rangeland conversion and the response to it required understanding changes in public rangeland ownership.

Our GIS analysis indicated that the area of public land increased between 1990 and 2009 for all three categories evaluated: federal, state, and county/city. The largest absolute increase was in state ownership (22,489 ha), whereas the largest proportional increase was in county/city land (34%). In both cases, the majority of this new public land was rangeland (18,228 ha or 15.5% and 11,108 ha or 28.6% for state and county/city, respectively; Table 2). A large area of San Diego County rangelands was already under federal ownership at the beginning of the study period (251,017 ha in 1990), but the proportional increase in holdings (2.9%) was relatively small compared to county or city lands (Table 2). Across the three categories of public land, the change in ownership resulted in public rangeland constituting 40% of the land in San Diego County by 2009 (Table 2, Fig. 1).

Table 2. Area (ha) of public rangeland in San Diego County, California, USA, and change in public rangeland between 1990 and 2009.

Public rangeland	Area in 1990 (%†)	Area in 2009 (%†)	Change in area 1990–2009	Change in proportion 1990–2009
Total	407,309 (37.1)	443,819 (40.4)	36,510	9.0
Federal	251,017 (22.9)	258,192 (23.5)	7175	2.9
State	117,396 (10.7)	135,624 (12.4)	18,228	15.5
County/city	38,895 (3.5)	50,003 (4.6)	11,108	28.6

†Proportion of the total land area in San Diego County.

Among most interviewees, the change from private to public ownership was seen as a problematic trend. Some interviewees indicated that they did not view the conversion of rangelands to other land uses and the change in rangeland ownership from private to public as completely distinct trends. When one rancher referred to large areas of land being "lost" for ranching, this included both urban development and conversion to public lands. Ranchers expressed concern that much of the best land was already owned by the government or had been sold to create public parkland. Some ranchers also mentioned the MSCP, expressing negative views on the management of land acquired through that program and its effect on private property rights.

Interviewees expressed concern that public lands were not actively managed, stating, "It's unfortunate that so much is owned by the government already. It is essentially abandoned land. It is not managed properly." Many ranchers expressed the view that "no management is bad management," and that government agencies "do not have the management skills and tools" to manage the land properly. Ranchers pointed to the benefits of grazing in terms of controlling invasive species ("land that is not grazed in this area is a thistle patch") and reducing fire hazard. While several interviewees noted problematic examples of overgrazed land in the county, they made clear their view that the other extreme, i.e., no grazing at all, brings a different set of problems. One rancher who leases land noted the value that grazing can have for public lands: "Monitored and managed grazing on public lands, without the financial pressure, allows land management and environmental management to be primary." This rancher also suggested that the transition toward public ownership of rangelands means that ranchers will increasingly need access to public rangelands for a grazing economy to continue to exist in the region. Given high land prices and low profitability of ranching, he stated, "It's not reality in southern California to buy land and manage it for grazing, so what's left is to graze public land."

DISCUSSION

Partnering with private land owners for conservation

Participation in conservation programs among ranchers in San Diego County was low relative to that in other studies, but the types of programs selected for participation were similar (Cheatum et al. 2011, Lubell et al. 2013). Lubell et al. (2013) cite four categories of variables that influence rancher participation in conservation programs: operator and operation characteristics (owned or leased acres, education, income), time horizon (e.g., number of generations ranching), social network connections, and social values (including views on property rights, government's role in protecting private property, and trust in government involvement in conservation). In San Diego County, social values strongly influenced ranchers' decisions regarding whether to participate in conservation programs, a finding consistent with research from other regions that highlights the importance of the level of trust in organizations or agencies (Marshall et al. 2000, Garbach et al. 2012, Brain et al. 2014, Henderson et al. 2014). In general, ranchers had low levels of trust in government and in the government's ability to manage rangelands, which discouraged participation. The rapid acquisition of rangelands by or for public agencies under the MSCP program (Greer 2004) likely exacerbated this lack of trust and contributed to ranchers' expressed perception that land is rapidly being "lost" to public agencies. Although it has been suggested that integrating biodiversity conservation into broader land-use planning efforts such as MSCP may increase its social acceptability (Greer 2004), our results indicate that it has had the opposite effect among ranchers. Given that MSCP has been cited as a model for other programs nationally (Greer 2004), it is important to consider the outcomes of such programs on landowners' perceptions, trust, and willingness to engage in conservation programs.

Although lack of awareness and lack of communication about programs were cited as important factors in our research and elsewhere (Cheatum et al. 2011, Lubell et al. 2013, Willcox and Giuliano 2014), our interviews suggested that more information or awareness would not change willingness to participate for many ranchers. Similarly, the number of generations ranching and operator or operation characteristics were not highly influential, except that ranchers who relied primarily on leased lands expressed greater interest in participating than those who relied primarily on privately owned lands. Because leased lands are ineligible for many conservation programs, expanding options available to those who rely primarily on privately or publicly leased lands might open future avenues for rangeland conservation.

Our research highlights two additional variables that influence rancher participation in conservation programs: (1) the amount of change required from existing land use or management, and (2) conflict or consistency with a rancher's land ethic. We found that ranchers in San Diego County almost exclusively participated in conservation programs that did not require a change in land management, i.e., the *Williamson Act,* which only requires land to be kept in agricultural production. It has been noted in other regions that incentives that primarily provide private benefits to landowners can help build trust between landowners and conservation agencies, which can then spill over to practices that provide public benefits (Garbach et al. 2012). However, in this case, there was no indication that participating in the *Williamson Act* had improved trust among participants. This case supports research from other regions indicating that participation is influenced by the degree of change in land use or management required, and that those who are economically dependent on their land are likely to avoid programs that reduce their land-use flexibility (Cross et al. 2011, Bremer et al. 2014). While concern over potential economic effects of changing land-use practices is critical, our research suggests that this preference goes beyond economic concerns, extending to questions of land health and land ethics. Similar to Conley et al.'s (2007) finding that a majority of ranchers surveyed had some concern for threatened and endangered species, many ranchers in our study expressed support for some conservation goals but questioned how they were approached. As noted by Cross et al. (2011:81), "A conservation ethic should not be assumed to indicate support for any one type of conservation practice or policy," and conservation programs would likely achieve higher participation by better understanding program preferences from the outset.

Our findings suggest that the types of social values viewed as important to participation in conservation programs could be expanded beyond a focus on landowner views regarding property rights and government involvement. Landowners expressed a conflict in land ethics, particularly among multigeneration ranchers. Their ranching practices have been developed over decades, and they were skeptical that land-use requirements designed by conservation programs would be appropriate to the local landscapes. This issue has been raised in other contexts; for example, farmers in Washington, USA cited the failure to consider local knowledge as a barrier to participating in conservation programs, noting that landowners have a very specific understanding of processes on their own land that tends to be ignored in favor of ecologists' expertise (Chan et al. 2015). Programs that recognize the conservation benefits of existing land management practices, the role ranchers have played as stewards of land where high conservation value has been maintained, and the role that human interactions with the environment play in maintaining ecosystem services are likely to be most successful (Henderson et al. 2014, Huntsinger and Oviedo 2014). Many ranchers have a strong stewardship ethic (Peterson and Horton 1995, Conley et al. 2007, Cross et al. 2011). As noted by Peterson and Horton (1995), aspects of a land ethic are likely shared between ranchers and conservation organizations and agencies, and focusing on these common values can provide an opportunity for dialogue.

Another finding that adds to the understanding of rancher participation in conservation programs relates to funding sources. In general, our findings support research noting a preference for conservation organizations over government agencies (Elmore et al. 2007). However, the statement by one rancher that private organizations do not have their own funding provides the opposite perspective and reflects broader questions that have been raised about transparency in funding land acquisition for conservation (Fairfax et al. 2005) and the role that private land conservation may play as an alternative to "underfunded and controversial land acquisition" (Brunson and Huntsinger 2008:137). Our finding suggests that a better understanding of ranchers' views on the source of financing, in addition to views on which agencies they are willing to work with, may improve program acceptance and could be ascertained through intake questionnaires by programs seeking rancher participation (Cross et al. 2011).

Shift from private to public ownership

Much of the focus on private land conservation is based on the idea that, with the inadequate extent of and funding for public lands, conservation on private lands is necessary to meet conservation goals (Knight 1999). However, in this case, the extent of public rangelands has expanded beyond that of private rangelands, a trend that is also evident in other parts of the world where state ownership of rangelands is being maintained or expanded (Reid et al. 2014). In western Australia, rangelands are being transferred to conservation reserves to improve the network of conservation lands, much like in San Diego County, and it has been noted that achieving acceptance of land tenure changes among local communities requires ongoing effort (van Etten 2013). In the case of San Diego County, the expansion of public land may also deter private landowners from participating in conservation programs given the views expressed by many ranchers regarding this trend. This finding suggests that an overlooked component of trust is the sense that the ranching community and the economy, which are already diminished by a range of economic and social factors, are being eroded further by the transfer of rangeland to public ownership. The implications of changing rangeland ownership for the ranching economy have been evaluated in the context of ownership change from traditional ranchers to amenity buyers (Gosnell and Travis 2005). Our study highlights another dimension of ownership change; while much of the west has long had large areas of public land, this case provides an example where public land is currently rapidly expanding. Morrison (2015:961) noted, "A conservation strategy needs to be based on an understanding of its impact on people. Although conservation organizations have long worked with people, they have generally not been systematic or rigorous

in assessing potential effects—positive and negative—of conservation on people." It may be argued that although there are many potential positive conservation outcomes associated with acquisition of public rangeland, a full assessment of the effect of this strategy on people, including the ranching community, would be valuable.

Our research also suggests that, given the current ownership of rangelands, the openness of public land managers to grazing leases may be as important as private landowners' willingness to participate in conservation programs. Reid et al. (2014:223) note, "in rangelands, tenure has inordinate importance," and changes in land tenure determine how land is used and managed, with implications for ecosystem patterns and processes (van Etten 2013). Past research has noted the importance of public land grazing in maintaining the sustainability of rangelands (Sulak and Huntsinger 2007, Cameron et al. 2014). For example, Sulak and Huntinger (2007:9) argue, "Public land grazing could be the glue holding many ranching communities together in the face of strong pressures to convert private rangeland to more intensive uses." Access to public rangeland is key for many ranchers, but our research indicates that this is especially true for new ranchers, who do not own land but may play an important role in maintaining a ranching community.

CONCLUSION

More than 15 years ago, Knight (1999:223) wrote, "We are entering a time when we in the United States value not only our national parks and wildlands, but increasingly appreciate the values of our middle lands, those working landscapes that in addition to providing essential commodities, capture a rural ambiance that we miss more with the demise of every additional family farm and ranch." In this case, the "middle lands" have shrunk dramatically because of two parallel trends: urbanization and conversion to public land. Our findings indicate that the degree to which those public lands remain working landscapes may ultimately determine the extent to which "middle lands" continue to exist within a matrix of urban areas, crop agriculture, and parks in the region. Our research provides insight into whether and when ranchers are likely to participate in conservation initiatives, but it also illustrates how private and public land conservation are strongly linked. Our findings highlight the idea that, "Neither local private control nor centralized public administration offers a panacea for range management" (Alagona 2008:325), and that separating conservation (public) and production (private) lands may be less effective than integrating public and private land conservation on the landscape (Norton 2000). These results have implications for range management throughout North America, where 13% of world's rangelands can be found. Given that rangelands have a greater extension globally than any other land type, these results can help inform conservation beyond this region (Reid et al. 2014).

Responses to this article can be read online at:
http://www.ecologyandsociety.org/issues/responses.php/9077

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LITERATURE CITED

Alagona, P. S. 2008. Homes on the range: cooperative conservation and environmental change on California's privately owned hardwood rangelands. *Environmental History* 13 (2):325-349. http://dx.doi.org/10.1093/envhis/13.2.325

Bonnie, R. 1999. Endangered species mitigation banking: promoting recovery through habitat conservation planning under the Endangered Species Act. *Science of the Total Environment* 240 (1-3):11-19. http://dx.doi.org/10.1016/s0048-9697(99)00315-0

Booker, K., L. Huntsinger, J. W. Bartolome, N. F. Sayre, and W. Stewart. 2013. What can ecological science tell us about opportunities for carbon sequestration on arid rangelands in the United States? *Global Environmental Change* 23(1):240-251. http://dx.doi.org/10.1016/j.gloenvcha.2012.10.001

Brain, R. G., M. E. Hostetler, and T. A. Irani. 2014. Why do cattle ranchers participate in conservation easement agreements? Key motivators in decision making. *Agroecology and Sustainable Food Systems* 38(3):299-316. http://dx.doi.org/10.1080/21683565.2013.819479

Bremer, L. L., K. A. Farley, and D. Lopez-Carr. 2014. What factors influence participation in payment for ecosystem services programs? An evaluation of Ecuador's SocioPáramo program. *Land Use Policy* 36:122-133. http://dx.doi.org/10.1016/j.landusepol.2013.08.002

Brunson, M. 2014. Unwanted no more: land use, ecosystem services, and opportunities for resilience in human-influenced shrublands. *Rangelands* 36(2):5-11. http://dx.doi.org/10.2111/rangelands-d-13-00064.1

Brunson, M. W., and L. Huntsinger. 2008. Ranching as a conservation strategy: Can old ranchers save the new West? *Rangeland Ecology and Management* 61(2):137-147. http://dx.doi.org/10.2111/07-063.1

Cameron, D. R., J. Marty, and R. F. Holland. 2014. Whither the rangeland?: Protection and conversion in California's rangeland ecosystems. Plos One 9(8):e103468. http://dx.doi.org/10.1371/journal.pone.0103468

Chan, K., M. Chapman, C. Chen, N. Enelow, T. Hesselgrave, and S. Klain. 2015. *The values of place: recreation and cultural ecosystem services in Puget Sound.* Report to the Puget Sound Institute. Ecotrust, Portland, Oregon, USA. [online] URL: https://www.eopugetsound.org/sites/default/files/features/resources/ValuesOfPlace_20150921.pdf

Cheatum, M., F. Casey, P. Alvarez, and B. Parkhurst. 2011. *Payments for ecosystem services: a California rancher perspective.* Conservation Economics White Paper. Defenders of Wildlife, Washington, D.C., USA. [online] URL: http://carangeland.org/images/payments_for_ecosystem_services_a_california_rancher-_perspective.pdf

Cocklin, C., N. Mautner, and J. Dibden. 2007. Public policy, private landholders: perspectives on policy mechanisms for sustainable land management. *Journal of Environmental Management* 85(4):986-998. http://dx.doi.org/10.1016/j.jenvman.2006.11.009

Conley, J. L., M. E. Fernandez-Gimenez, G. B. Ruyle, and M. Brunson. 2007. Forest service grazing permittee perceptions of the Endangered Species Act in southeastern Arizona. *Rangeland Ecology and Management* 60(2):136-145. http://dx.doi.org/10.2111/06-094r1.1

Cross, J. E., C. M. Keske, M. G. Lacy, D. L. K. Hoag, and C. T. Bastian. 2011. Adoption of conservation easements among agricultural landowners in Colorado and Wyoming: the role of economic dependence and sense of place. *Landscape and Urban Planning* 101(1):75-83. http://dx.doi.org/10.1016/j.landurbplan.2011.01.005

Elmore, R. D., T. A. Messmer, and M. W. Brunson. 2007. Perceptions of wildlife damage and species conservation: lessons learned from the Utah prairie dog. *Human-Wildlife Conflicts* 1 (1):78-88.

Fairfax, S. K., L. Gwin, M. A. King, L. Raymond, and L. A. Watt. 2005. *Buying nature: the limits of land acquisition as a conservation strategy, 1780–2004.* MIT Press, Cambridge, Massachusetts, USA.

Franklin, J., H. M. Regan, L. A. Hierl, D. H. Deutschman, B. S. Johnson, and C. S. Winchell. 2011. Planning, implementing, and monitoring multiple-species habitat conservation plans. *American Journal of Botany* 98(3):559-571. http://dx.doi.org/10.3732/ajb.1000292

Fry, J. A., M. J. Coan, C. G. Homer, D. K. Meyer, and J. D. Wickham. 2009. *Completion of the National Land Cover Database (NLCD) 1992–2001 Land Cover Change Retrofit product.* Open-File Report 2008-1379. U.S. Geological Survey Earth Resources Observation and Science (EROS) Center, Sioux Falls, South Dakota, USA. [online] URL: https://pubs.usgs.gov/of/2008/1379/

Garbach, K., M. Lubell, and F. A. J. DeClerck. 2012. Payment for ecosystem services: the roles of positive incentives and information sharing in stimulating adoption of silvopastoral conservation practices. *Agriculture, Ecosystems and Environment* 156:27-36. http://dx.doi.org/10.1016/j.agee.2012.04.017

Gosnell, H., N. Robinson-Maness, and S. Charnley. 2011. Engaging ranchers in market-based approaches to climate change mitigation: opportunities, challenges, and policy implications. *Rangelands* 33(5):20-24. http://dx.doi.org/10.2111/1551-501X-33.5.20

Gosnell, H., and W. R. Travis. 2005. Ranchland ownership dynamics in the Rocky Mountain West. *Rangeland Ecology and Management* 58(2):191-198. http://dx.doi.org/10.2111/1551-5028(2005)58<191:RODITR>2.0.CO;2

Greer, K. A. 2004. Habitat conservation planning in San Diego County, California: lessons learned after five years of implementation. *Environmental Practice* 6(3):230-239. http://dx.doi.org/10.1017/s1466046604000377

Henderson, A. E., M. Reed, and S. K. Davis. 2014. Voluntary stewardship and the Canadian Species at Risk Act: exploring rancher willingness to support species at risk in the Canadian prairies. *Human Dimensions of Wildlife* 19(1):17-32. http://dx.doi.org/10.1080/10871209.2013.819595

Hierl, L. A., J. Franklin, D. H. Deutschman, H. M. Regan, and B. S. Johnson. 2008. Assessing and prioritizing ecological communities for monitoring in a regional habitat conservation plan. *Environmental Management* 42(1):165-179. http://dx.doi.org/10.1007/s00267-008-9109-3

Hilty, J., and A. M. Merenlender. 2003. Studying biodiversity on private lands. *Conservation Biology* 17(1):132-137. http://dx.doi.org/10.1046/j.1523-1739.2003.01361.x

Homer, C., J. Dewitz, J. Fry, M. Coan, N. Hossain, C. Larson, N. Herold, A. McKerrow, J. N. VanDriel, and J. Wickham. 2007. Completion of the 2001 National Land Cover Database for the conterminous United States. *Photogrammetric Engineering and Remote Sensing* 73(4):337-341.

Huntsinger, L., and J. L. Oviedo. 2014. Ecosystem services are social-ecological services in a traditional pastoral system: the case of California's Mediterranean rangelands. *Ecology and Society* 19(1):8. http://dx.doi.org/10.5751/ES-06143-190108

Jin, S., L. Yang, P. Danielson, C. Homer, J. Fry, and G. Xian. 2013. A comprehensive change detection method for updating the National Land Cover Database to circa 2011. *Remote Sensing of Environment* 132:159-175. http://dx.doi.org/10.1016/j.rse.2013.01.012

Knight, R. L. 1999. Private lands: the neglected geography. *Conservation Biology* 13(2):223-224. http://dx.doi.org/10.1046/j.1523-1739.1999.013002223.x

Kosoy, N., E. Corbera, and K. Brown. 2008. Participation in payments for ecosystem services: case studies from the Lacandon rainforest, Mexico. *Geoforum* 39(6):2073-2083. http://dx.doi.org/10.1016/j.geoforum.2008.08.007

Lubell, M. N., B. B. Cutts, L. M. Roche, M. Hamilton, J. D. Derner, E. Kachergis, and K. W. Tate. 2013. Conservation program participation and adaptive rangeland decision-making. *Rangeland Ecology and Management* 66(6):609-620. http://dx.doi.org/10.2111/rem-d-13-00025.1

Marshall, A., D. Hoag, and A. Seidl. 2000. *Colorado landowner conservation easement survey.* Technical Bulletin 02-3. Colorado Experiment Station, Colorado State University, Fort Collins, Colorado, USA.

Merenlender, A. M., L. Huntsinger, G. Guthey, and S. K. Fairfax. 2004. Land trusts and conservation easements: Who is conserving what for whom? *Conservation Biology* 18(1):65-75. http://dx.doi.org/10.1111/j.1523-1739.2004.00401.x

Morrison, S. A. 2015. A framework for conservation in a human-dominated world. *Conservation Biology* 29(3):960-964. http://dx.doi.org/10.1111/cobi.12432

Norton, D. A. 2000. Conservation biology and private land: shifting the focus. *Conservation Biology* 14(5):1221-1223. http://dx.doi.org/10.1046/j.1523-1739.2000.01451.x

Peterson, T. R., and C. C. Horton. 1995. Rooted in the soil: how understanding the perspectives of landowners can enhance the management of environmental disputes. *Quarterly Journal of Speech* 81(2):139-166. http://dx.doi.org/10.1080/00335639509384106

Reid, R. S., M. E. Fernández-Giménez, and K. A. Galvin. 2014. Dynamics and resilience of rangelands and pastoral peoples around the globe. *Annual Review of Environment and Resources* 39:217-242. http://dx.doi.org/10.1146/annurev-environ-020713-163329

Rissman, A. R., and N. F. Sayre. 2012. Conservation outcomes and social relations: a comparative study of private ranchland conservation easements. *Society and Natural Resources* 25 (6):523-538. http://dx.doi.org/10.1080/08941920.2011.580419

Sayre, N. F. 2004. Viewpoint: the need for qualitative research to understand ranch management. *Journal of Range Management* 57(6):668-674. http://dx.doi.org/10.2458/azu_jrm_v57i6_sayre

Sayre, N. F., R. R. J. McAllister, B. T. Bestelmeyer, M. Moritz, and M. D. Turner. 2013. Earth stewardship of rangelands: coping with ecological, economic, and political marginality. *Frontiers in Ecology and the Environment* 11(7):348-354. http://dx.doi.org/10.1890/120333

Sulak, A., and L. Huntsinger. 2007. Public land grazing in California: untapped conservation potential for private lands? *Rangelands* 29(3):9-12. http://dx.doi.org/10.2458/azu_rangelands_v29i3_sulak

Syphard, A. D., K. C. Clarke, J. Franklin, H. M. Regan, and M. Mcginnis. 2011. Forecasts of habitat loss and fragmentation due to urban growth are sensitive to source of input data. *Journal of Environmental Management* 92(7):1882-1893. http://dx.doi.org/10.1016/j.jenvman.2011.03.014

Underwood, J. G. 2011. Combining landscape-level conservation planning and biodiversity offset programs: a case study. *Environmental Management* 47(1):121-129. http://dx.doi.org/10.1007/s00267-010-9589-9

Van Etten, E. J. B. 2013. Changes to land tenure and pastoral lease ownership in Western Australia's central rangelands: implications for co-operative, landscape-scale management. *Rangeland Journal* 35(1):37-46. http://dx.doi.org/10.1071/RJ11088

Weiss, S. B. 1999. Cars, cows, and checkerspot butterflies: nitrogen deposition and management of nutrient-poor grasslands for a threatened species. *Conservation Biology* 13(6):1476-1486. http://dx.doi.org/10.1046/j.1523-1739.1999.98468.x

Wetzel, W. C., L. L. Lacher, D. S. Swezey, S. E. Moffitt, and D. T. Manning. 2012. Analysis reveals potential rangeland impacts if Williamson Act eliminated. *California Agriculture* 66 (4):131-136. http://dx.doi.org/10.3733/ca.v066n04p131

Willcox, A. S., and W. M. Giuliano. 2014. Explaining cattle rancher participation in wildlife conservation technical assistance programs in the southeastern United States. *Rangeland Ecology and Management* 67(6):629-635. http://dx.doi.org/10.2111/rem-d-13-00114.1

Yahdjian, L., O. E. Sala, and K. M. Havstad. 2015. Rangeland ecosystem services: shifting focus from supply to reconciling supply and demand. *Frontiers in Ecology and the Environment* 13 (1):44-51. http://dx.doi.org/10.1890/140156